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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/905,286	07/13/2001	Cem Basceri	MI22-1724	3892

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EXAMINER
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FULLER, ERIC B

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 08/13/2002

16

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Applicant No.

09/905,286

Applicant(s)

BASCERI ET AL.

Examiner

Eric B Fuller

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Priority Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 29 July 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 14.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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## **DETAILED ACTION**

### ***Request for Continued Examination***

The request filed on July 29, 2002 for continued examination (RCE) under 37 CFR 1.114 based on parent Application No. 09/905,286 is acceptable and an RCE has been established. An action on the RCE follows.

### ***Terminal Disclaimer***

The terminal disclaimer filed on July 29, 2002 disclaiming the terminal portion of any patent granted on this application that would extend beyond the expiration date of U.S. Patent Application Serial No. 09/776,217 has been reviewed and is accepted. The terminal disclaimer has been recorded.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 23 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 23 claims that the second oxidizer comprises hydrogen peroxide. This is confusing as the first oxidizer that the second oxidizer is mixed with is hydrogen peroxide as well. Additionally, hydrogen peroxide is not listed in claim 18 as being a possible second oxidizer.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 - 4, 6 - 9, and 11 - 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stauf et al. (US 6,277,436 B1) in view of Senzaki et al. (US 6,238,734 B1).

Stauf teaches a process where a barium strontium titanate comprising dielectric layer is produced on a substrate. The process is performed by an MOCVD process that utilizes Ba(thd)<sub>2</sub>, Sr(thd)<sub>2</sub>, Ti(O-I-Pr)(thd)<sub>2</sub> and an oxidizing co-reactant as the precursors (column 6, lines 55-65; column 8, lines 23-25; column 9, line 65, to column 10, line 10). The reactants may be provided as a combined feed (column 7, lines 40-45), which reads on simultaneously providing the feeds. The substrate is held at 400 -1200 degrees Celsius by the use of a susceptor (column 8, lines 25-30). Stauf discloses that the oxidizing co-reactant can be "any suitable type providing an oxygen containing environment in which the high dielectric metal oxide film is formed on the substrate" (column 8, lines 23-26), but does not explicitly disclose applicant's claimed oxidizing species.

Senzaki teaches suitable oxygen sources for mixture with metalorganic precursors for performing chemical vapor deposition of mixed metal oxide films

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are oxygen, ozone, nitrous oxide, nitric oxide, nitrogen dioxide, water, hydrogen peroxide, air, and mixtures thereof (column 3, lines 40-43 and 57).

Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to use the oxygen sources of Senzaki as the oxidizing co-reactants of Stauf as all of the oxygen sources contain oxygen and hence would meet the requirement of Stauf for the oxidizing co-reactant of "providing an oxygen-containing environment".

Claims 5 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stauf et al. (US 6,277,436) in view of Senzaki et al. (US 6,238,734 B1), as applied to claims 1 and 6 above, and further in view of Kang (US 6,127,218).

Stauf in view of Senzaki teaches the methods of claims 1 and 6 as shown above and further teaches that the mixed metal oxide films are for use in the semiconductor industry, but fails to teach that the layer is not homogenous. However, Kang teaches a process where by adjusting the oxidant stream, it is possible to adjust the composition of the BST film. By having multiple layers of differing composition, the dielectric constants are increased and the leakage currents are decreased (column 2, lines 45-50). These trends are desirable for ferroelectric films, which are used in the semiconductor industry. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to adjust the oxidant stream such that layers of differing composition are produced, as taught by Kang, in the method of Stauf in view of

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Senzaki. By doing so, one would reap the benefits of increasing the dielectric constant of the film and reducing the leakage current, making for a better ferroelectric film.

Claims 1-4, 6-9, and 11-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stauf et al. (US 6,277,436 B1) in view of DiMeo, Jr. et al. (US 5,972,430).

Stauf teaches a process where a barium strontium titanate comprising dielectric layer is produced on a substrate. The process is performed by an MOCVD process that utilizes  $\text{Ba}(\text{thd})_2$ ,  $\text{Sr}(\text{thd})_2$ ,  $\text{Ti}(\text{O}-\text{I}-\text{Pr})(\text{thd})_2$  and an oxidizing co-reactant as the precursors (column 6, lines 55-65; column 8, lines 23-25; column 9, line 65, to column 10, line 10). The reactants may be provided as a combined feed (column 7, lines 40-45), which reads on simultaneously providing the feeds. The substrate is held at 400 –1200 degrees Celsius by the use of a susceptor (column 8, lines 25-30). Stauf discloses that the oxidizing co-reactant can be “any suitable type providing an oxygen containing environment in which the high dielectric metal oxide film is formed on the substrate” (column 8, lines 23-26), but does not explicitly disclose applicant's claimed oxidizing species.

However, Dimeo, Jr. et al. teaches that suitable oxidizers for depositing BST films onto substrates are oxygen, ozone, nitrous oxide, nitric oxide, nitrogen dioxide, water vapor, hydrogen peroxide vapor, and mixtures thereof (column 9, lines 1-4). Therefore it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize such oxidation mixtures

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in the process taught by Stauf with a reasonable expectation of success. It is noted that DiMeo, Jr. discloses a "digital" process wherein the BST precursors are first deposited and then oxidized. However, the oxidizing agents of DiMeo, Jr. would all clearly meet the requirement of Stauf for the oxidizing co-reactant of "providing an oxygen-containing environment in which the high dielectric film is formed", as all of these species are oxidizers that contain oxygen atoms.

Claims 5 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stauf et al. (US 6,277,436) in view of DiMeo, Jr. et al. (US 5,972,430), as applied to claims 1 and 6 above, and further in view of Kang (US 6,127,218).

Stauf in view of DiMeo, Jr. teaches the methods of claims 1 and 6 as shown above and further teaches that the mixed metal oxide films are for use in the semiconductor industry, but fails to teach that the layer is not homogenous. However, Kang teaches a process where by adjusting the oxidant stream, it is possible to adjust the composition of the BST film. By having multiple layers of differing composition, the dielectric constants are increased and the leakage currents are decreased (column 2, lines 45-50). These trends are desirable for ferroelectric films, which are used in the semiconductor industry. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to adjust the oxidant stream such that layers of differing composition are produced, as taught by Kang, in the method of Stauf in view of DiMeo, Jr. By doing so, one would reap the benefits of increasing the dielectric

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constant of the film and reducing the leakage current, making for a better ferroelectric film.

### ***Response to Arguments***

Applicant argues that the “new matter” rejection of the previous action is improper. The argument is found persuasive and the rejection has been accordingly withdrawn for the reasons indicated by the applicant.

Applicant argues that Senzaki fails to anticipate each and every limitation due to barium, strontium, and titanium only being present in an extensive list of possibilities. Applicant argues that one of ordinary skill in the art would not be able to “at once envisage” the specific combination of barium, strontium, and titanium. Examiner agrees and has therefore withdrawn the previous 35 USC 102 rejection based on Senzaki. However, the new grounds for rejection overcome this argument as Stauf provides the motivation for one of ordinary skill in the art to produce a barium, strontium, and titanium oxide film. To use the oxidizers of Senzaki to produce the BST film of Stauf would have been obvious, as shown above.

All other arguments pertain to the lack of motivation in Senzaki to specifically make a BST film. Therefore, these arguments are moot in view of the new grounds for rejection.

### ***Conclusion***



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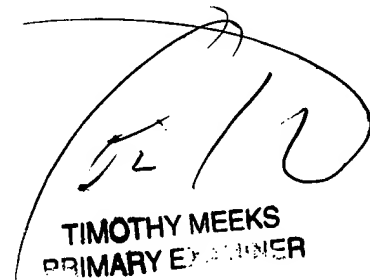
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B Fuller whose telephone number is (703) 308-6544. The examiner can normally be reached on Mondays through Thursdays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck, can be reached at (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



EBF  
August 9, 2002



TIMOTHY MEEKS  
PRIMARY EXAMINER